

PREHISTORIC MONUMENTS IN THE OUTER HEBRIDES, AND
THEIR ASTRONOMICAL SIGNIFICANCE.

[WITH PLATES VII-IX.]

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DURING the summer of 1909 my duties took me to the neighbourhood of the Outer Hebrides; and the wintry gales which marked that season, having driven me more than once into harbour from hydrographic work in the offing, gave me the chance of visiting some of the prehistoric monuments, of which so many specimens remain on these bleak coasts.

In this paper I propose to discuss the surveys of these monuments, with theodolite and chain, that I was then able to make; and I think I shall be able to show some interesting results from the azimuths, or orientations to be found in them; and to add one more stone to the cairn of evidence which is slowly being accumulated in support of the astronomical,—or, perhaps I should say, astrological—intention of these ancient remains.

I am assuming that the structures in question are the remnants of edifices set up for the purposes of religion, or burial, or for both. The long avenues of stones, anyway, could not have formed part of a *dwelling* house; which presupposes a roofed place.

Careful investigation seems to show that they were, in some cases, places of worship, with burials made in and round them afterwards,—churches, as it were, with graveyards and intra-mural tombs, as we still see to be customary; or else, in other cases, mausolea, built solely to contain the dead, though with the further intention, possibly, of some form of ancestor worship.

The object of the orientationist is to show that this cult, whatever else it was, was connected definitely with the heavenly bodies: sun, moon, and stars.

The monuments with which I deal here are situated in the Hebrides:—in the north-western part of the Island of Lewis, and in St. Kilda. Those in the first-named island are fairly well known, but have never adequately been discussed from the astronomical standpoint; while those in St. Kilda are, so far as I can ascertain, new to science, and are here described for the first time.

I.—“THE GREAT CIRCLE” OF CALLANISH.

(Gaelic “*Tursachan Challanish.*”)

This imposing group of forty-eight megaliths stands on the crest of a small peninsula near the head of East Loch Roag, on the western coast of the Isle of Lewis. The surrounding view is of a hilly country, wild and treeless, covered with heather. Though elevated 100 feet above the sea level, the water of the sea loch is not visible, except in a few gleams here and there, as it winds inwards to Callanish, 7 miles from the open sea.

The accompanying map of the locality (Fig. 1) shows its position, as well as that of other circles with regard to it; and attention is also called to the plan, which is reduced from a careful survey, plotted originally on the scale of $\frac{1}{10}$ inch to 1 foot.

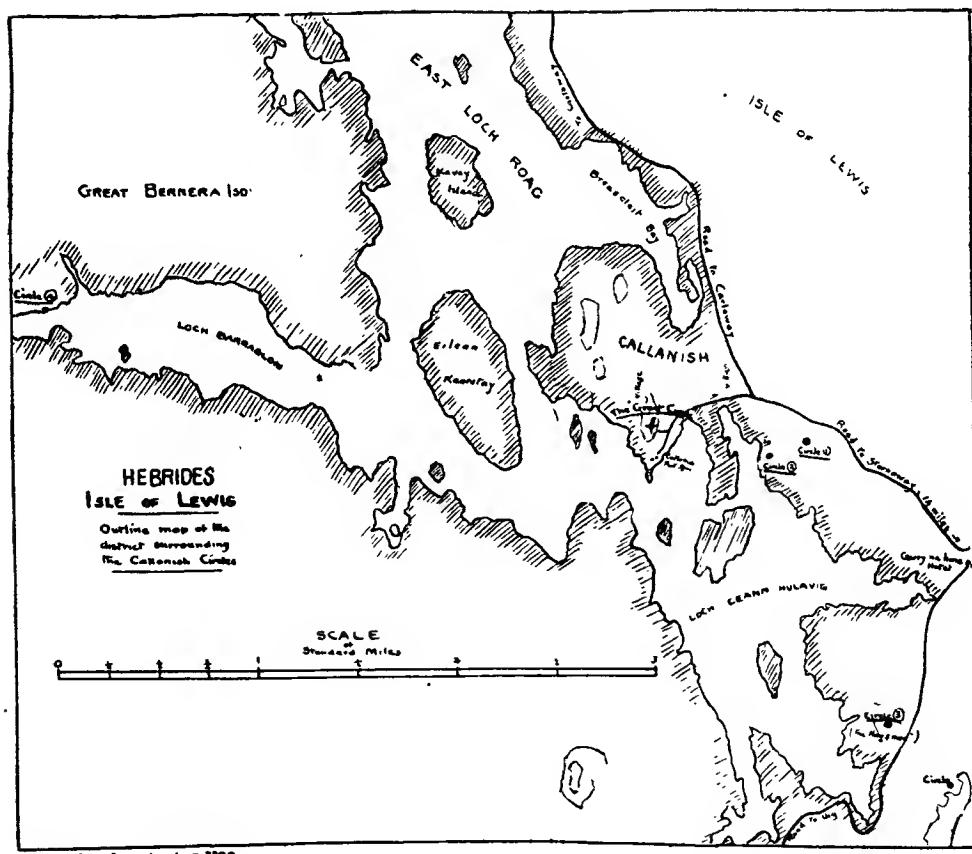


FIG. 1.—MAP OF CALLANISH AND DISTRICT.

I may remark in passing, that it is by laying down the relative positions and attitudes of the stones forming a megalithic group, on a sufficiently large and open scale, such as the above, that alone is it possible to appreciate their orientation. And it is equally important to present them with the true north always directed

in the same way on the paper; that is, most conveniently, upwards, as in a map. It is difficult, indeed, to grasp the identity of orientation of two or more separated monuments, when they are presented, (as they usually are), with the north and south meridian laid down in any and every direction.

The remains consist, as will be seen (Fig. 2), of the following chief features:—

- A. Two long lines of menhirs, running nearly parallel to one another, a little eastward of true north. (I shall refer to these as "A east" and "A west," respectively, when describing them.)
- B. A short line of menhirs, lying in an east and west direction.
- C. A longer line, lying in a north and south direction.
- D. A short line, lying in a direction slightly northward of east.
- E. A "circle" of thirteen great menhirs.

Besides these, there are a chambered sepulchre; a very large single menhir (which dominates the whole group) lying within the perimeter of the "circle" and three single menhirs without it, to the north-east, south-east, and south-west respectively, standing at no great distance from it.

Before entering into a discussion of these various parts, it may perhaps be advisable to give some explanation of the method by which astronomy is brought to bear upon the archæology of megalithic structures.

When a row of standing stones, or several rows, as at Callanish, have been set up in straight lines, it seems rational to suppose that it was done with some intention, dependent on the direction in which they lie. This becomes even more obvious when it is found that in monuments differing widely in geographical position, the direction of these rows, or alignments, is towards the same points of the horizon. Occasionally the eye is directed by the line of stones to a hill-top, or a cairn on a hill-summit; sometimes, as at Callanish, no object, natural or otherwise, lies along the lines of sight in either direction.

But merely to direct the eye towards such an object as a distant cairn does not seem a very purposeful proceeding; still less is it so when the line leads the eye neither to a cairn nor to anything particularly conspicuous on the earthly horizon. The inference is that we must look beyond the terrestrial termination of the line for some celestial body; and if such, it must naturally be at that moment of its path when it is either rising or setting behind the horizon of the observer. As this land horizon is always elevated above the true, or sea horizon, the body must, at the time of observation, be itself elevated by the same amount.

All heavenly bodies are positioned in the sky by astronomers, according to their right ascension, and declination. These terms correspond, roughly speaking, to the co-ordinates by which a spot is located on the earth; namely, to longitude and latitude respectively. Right ascension governs the time of rising of a heavenly body, declination the bearing on which it rises. If the latitude of the observer, the bearing of the heavenly body, and its elevation above the true, or sea horizon,

be known, it is easy to calculate the declination of the body, which would be seen on such a bearing.

Now, the declinations, and right ascensions of all heavenly bodies are always slowly and progressively altering; and consequently no star rises on exactly the same bearing, nor at the same time on any particular day of the year, as it did on the same day in any previous year. The alteration is small, but is known with considerable accuracy for all the principal stars:—for no two stars have precisely the same “precessional movement” and “proper motion,” to which the changes in position are due. It is not difficult, therefore, having this knowledge, and having found the declination inferred in the bearing and altitude of an alignment, to state definitely the name of a star, with the appropriate year, day, and hour, when the alignment pointed to its rising. This is true also of the Sun and Moon, but a considerably less definite date is afforded by either of them: in the case of the Sun, as the rate of its change is so small; and in the case of the Moon, as it is so irregular. Even in the case of stars, though the movement is, generally speaking, sufficiently great, and sufficiently well known to be able to obtain a date within perhaps ten or twenty years of the truth, *accurate* observation of the alignment is necessary. A date can only be allotted within margins of, say, one hundred years in some cases, where the aligning menhirs have become only slightly shifted through some cause from their original positions; and where judgment has had, accordingly, to be exercised as to the correct theodolite reading of the bearing of the line. It will be obvious also, that the longer the alignment is,—the greater the distance is from the observation position to the end menhir of the line, or to the mountain peak, or cairn, seen against the sky, to which it exactly directs the eye—the more certain, and the more easily observed will be the bearing and altitude.

It may be objected that among the great multitude of stars it would be easy to find several that would have had, at various epochs, the declination ascertained from any particular alignment, and that the dates derived from such declination could thus land you into almost any century. The multitude of stars is, no doubt, great; but bright stars, and still more bright stars of particular conspicuousness (owing to their isolated position in the heavens, or colour, etc.), are remarkably few. And when the period in which we are to look for a date is limited, as for our purposes it must be, by that of the Christian era at one end, and the probability of the date of the beginning of the Stone Age in these islands, (to which period these megalithic monuments are allowed on all hands to belong), at the other, namely, between 3,000 and 4,000 B.C., and the first two or three centuries A.D., the chances of error are still more reduced.

In the description that follows I have, however, given the names and dates of *all* the bright stars whose declinations are inferrable from the “star-lines” that could have been observed along them, within the above limits of time, and discussed the probabilities as regards the dates thus derived.

I shall deal first with the two longer lines of stones trending to the north-

ward, "A east" and "A west," as giving the most definite results; firstly, on account of their length, which provides a dependable azimuth, and next because the northern end of each line is terminated by a high and conspicuous menhir, 4 or 5 feet taller than any of the other stones of the lines, which, therefore, give a definite object for observation.¹

LINE "A EAST."

I shall first deal with the eastern of the two lines, which consists of eight stones. In order to determine its azimuth, I chose a spot to the southward, whence all the stones composing it came into alignment with the high menhir at its northern end, and there set up my theodolite. There seemed to be the foundations of a standing stone at this point, though no other vestige of it remained; but in any case, the azimuth was exactly obtainable from here, and is N. $9^{\circ} 49' 30''$ E. This, with the hill-crest altitude seen along it of $1^{\circ} 10'$, produce a star with declination $32^{\circ} 26' 37''$ N.

LINE "A WEST."

The western line consists of ten stones. The seven northern ones, including the tall terminal menhir, are, with one exception, still all in line; but the three nearest the circle are evidently either displaced or else never belonged to the line; for it is not now possible to get them into alignment with it. The six stones, however, that do remain *in situ* present a line, which, being produced across the circle, exactly strikes a tall menhir which stands some feet outside it to the southwestward; and I have little doubt that this important-looking stone was the original southern termination of the line, and still remains in position; while its companion for the southern end of the eastern line has disappeared.

The azimuth of "A west" from this position is N. $11^{\circ} 10' 0''$ E., and this, with the hill-crest altitude seen along it of $1^{\circ} 14' 50''$, produce a star with declination of $32^{\circ} 28' 12''$ N.; a result so close to that derived from the "A east" alignment that there is no doubt that both directed to the same star, though, as will be seen, the two alignments are not parallel, differing as they do by $1\frac{1}{3}^{\circ}$ in bearing. The reason for this is as follows:—The rising path of the star with the above declination would not be vertically upwards, as seen at Callanish, but on the arc of a circle, with the pole of the heavens as centre; and thus would have an apparent movement, when first rising, from left to right; so that, as it increased its altitude, so

¹ All calculations in connection with the sun in the following pages are worked as for an observation of the sun's centre.

The declinations of stars, at various epochs, are taken from the tables in the first volume of *Handbuch der Mathematischen und Technischen Chronologie*, by Professor F. K. Ginzel, published in 1906.

it increased its angular distance from the pole. The observer, looking along "A east," which has the lesser altitude and smaller azimuth, was the first to see the star rising above that part of the hill-crest to which it directed. It was then still hidden from the observer looking along the other line of stones, but, a few moments later, the star emerged above the higher part of the hill-crest to which "A west" was directed, a little to the right of the "A east" spot, and completed the observation. The same star was, in fact, seen along each line, but at slightly differing positions of its path up the heavens.

The bright stars and dates to which this declination ($32^{\circ} 27' N.$) may refer are as follows :—

Capella in 1800 B.C.

Castor in 650 B.C.

Arcturus in 320 B.C.

For reasons to be discussed later, connected with the time of rising of this star, and also with the date to be derived from line D, it seems most likely that the star Capella, at its appropriate date, was the object of observation; but, astronomically speaking, each of these stars, and dates, has equal probabilities. I shall accordingly, for convenience, refer to these lines in future as the "Capella" lines; remarking, in passing, that alignments for this star have been found at various dates in several other prehistoric monuments in Great Britain.

This matter of the date does not exhaust the interest of these two lines, for if each alignment be produced sufficiently far to the southward, it will then be seen that the centre of the sepulchre and of its circular tumulus lies exactly on the middle line of the avenue formed by them; and besides this, the line of direction of the stones forming the dividing walls of the two burial vaults of the sepulchre is parallel to the avenue also. There can thus be little doubt that the double line of menhirs and the sepulchre are connected one with another, have the same astrological intention, and most likely were erected simultaneously. These connections, I may add, have only become apparent after the survey of the whole monument had been plotted on a sufficiently large scale, and is an instance of the scientific value of this method of examination. The fact that the centre of the tumulus lies on the central line of the avenue cannot otherwise be appreciated, nor is the parallelism of the long lines of stones forming the avenue with those of the sepulchre divisions apparent by casual observation.

The last point of interest concerning the "Capella" lines to which I would direct attention is the connection between them and the outlying stone standing at about 15 feet to the north-east of the circle. This is evidently a stone of importance. It is of regular form, with its sides made flat (or particularly chosen because they were naturally smooth and parallel), and has, when viewed in plan, one end square, but the other wedge shaped; the point of the wedge being directed to the south-westward. If its present attitude in the ground is that in which

it was originally "planted," it will be seen that it is directed exactly to the tall menhir standing 10 feet outside, and to the south-westward of the circle, which I have supposed to be the termination of the western "Capella" line; and this affords strong probability that the two stones are in connection one with another. Standing at this south-western stone, the azimuth of the north-eastern, combined with the altitude of the horizon seen beyond it (at a somewhat marked dip in the distant hills), produces a declination of $28^{\circ} 10' 25''$ N.

When first reaching this result, I was somewhat puzzled as to its meaning, for I had fully expected that the direction given by the line would turn out to be for the solstitial sunrise, which would entail a declination of about 24° N. Obviously, therefore, it could not be a sun-line; nor does this declination belong to any *probable* star in "prehistoric" times except, perhaps, Pollux, in about 1200 B.C. The only heavenly body to which otherwise it could refer is the moon, and in view of the fact that I have obtained a similar declination, along undoubted sightlines, in several other monuments in other parts, I venture to put forward the following suggestion. The moon has a cycle of nineteen years (roughly), within which it changes its tropical declination from 28° to 18° , and back again to 28° . The rising of the full moon, when it is at its northern tropical declination, only occurs at or near the date of the winter solstice, and if the azimuth of this event, (full moon rise), were marked when the moon had reached its greatest possible declination of 28° N., this full moon rise would indicate the beginnings of periods of nineteen years, and also be closely connected with a definite solar event, viz., the winter solstice. This period of nineteen years is, as I need not point out, the Metonic Cycle of ancient Greece, though I do not know how, nor from what lunar event, it was there measured. The possibility of the agreement in this length of a calendrical cycle between the two countries is at least of interest, though, if I am right in my conjectures, it was observed in our islands in 1800 B.C., which antedates by nearly 1400 years its establishment in Greece, where it is said to have been initiated in 432 B.C. (see quotation on p. 31).

LINE B.

This line, composed of four menhirs, is constructed in a similar fashion to the two Capella-pointing lines, namely, of flat slabs placed in the ground in the direction of the line, and terminated by a taller menhir of nearly square section.

This end stone, and the next to it, are still upright; the other two between them and the circle, lean slightly to the northward, as may be seen in the photograph; which causes the bases, as plotted in the ground plan, to throw the line a little out in that direction, but it will be realized that if these two stones were standing upright all four would be exactly in a line. The azimuth of this line, combined with the altitude of the horizon along it, produce a declination of $0^{\circ} 35' 19''$ N.: that is to say, for sunset at the day of equinox. Of that, there can be no doubt whatever.

LINE C.

This line is composed, at present, of five menhirs; but, by the gaps in it, evidently comprised, originally, at least three more.

From the southernmost of the stones still remaining in place, the line runs true north, within 1° , up to the great slab, about 14 feet high, which stands within the "circle," and as all three of the lines already discussed terminate in larger and distinctive pillar stones than those forming the rest of the line, it seems more likely that the eye was intended to be directed in this line, also, *towards* the important stone, rather than from it to the southward, where there is no trace of such a menhir.

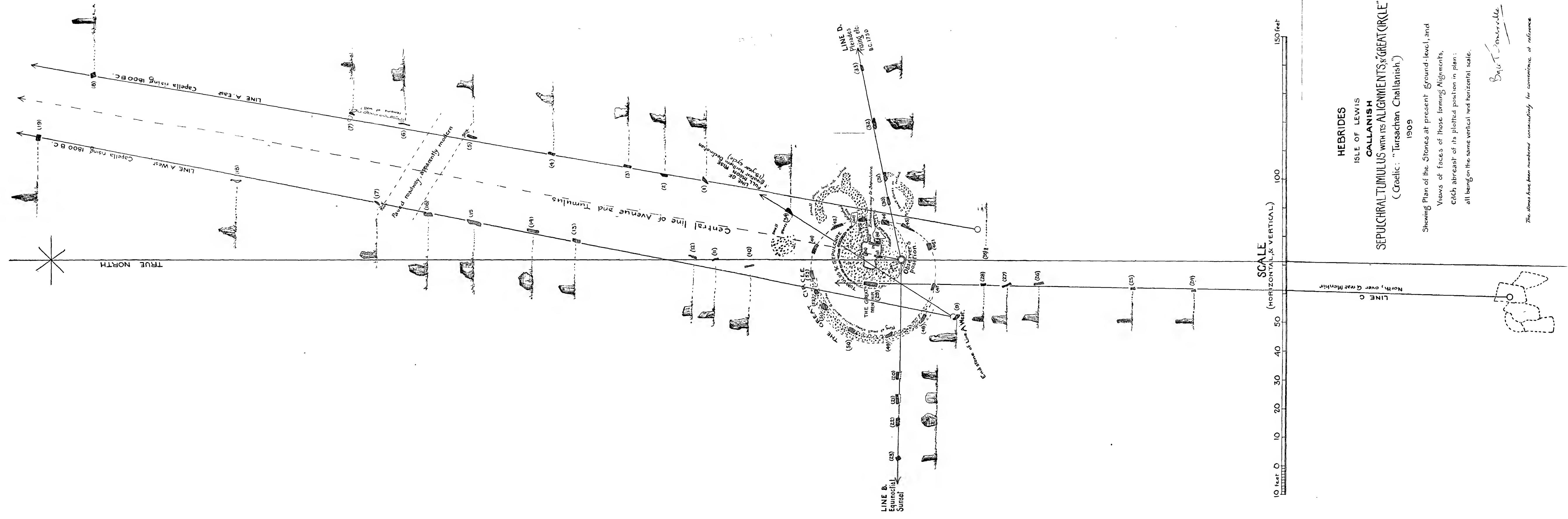
I should add that near the southern end of line C there is a collection of enormous boulders, so enormous that their heaping together can scarcely be other than natural, though there is a sort of symmetry in their disposition, which renders an opposite view permissible. This group of boulders lies exactly on the continuation to the southward of line C, and, standing on the flat surface their top affords, one can suppose oneself to be at the observing position for an azimuth of true north, along the line to the great central menhir; but this is the merest conjecture, and has no great importance in itself, astronomically speaking. I am not prepared to say how this alignment to the true north was obtained by the ancients. Polaris (α Ursæ Minoris), the so-called "Pole Star" of our times (though it is not yet actually polar), had a declination of $68\frac{1}{2}^{\circ}$ N. at the date of the monument given by the "Capella" lines (1800 B.C.); that is to say, it circled round the north pole of the heavens at a distance from it of $21\frac{1}{2}^{\circ}$. The ancients may have had sufficient knowledge to divide equally the distance between the eastern and western points of the circumpolar path of Polaris, in order to obtain its polar centre; or, facing the other way, a north and south line may have been laid out, by finding the meridian position of the sun (that is, when it bore due south), through the shortest length of the shadow thrown by the great menhir; but, whatever method was employed, the fact remains that the line of stones under discussion does present a practically true north and south bearing.

LINE D.

The stones of this line are somewhat disarranged from their original regularity, though not seriously, and it is not difficult to obtain a mean alignment, which shall include all the four stones very fairly. The azimuth of this alignment, combined with the altitude of the horizon seen along it, produce a declination of $6^{\circ} 43'$ N. which refers to the following stars and dates, viz.:—

Pleiades rising in 1750 B.C.
 Spica in 1270 B.C.
 α Arietis in 1130 B.C.
 Aldebaran in 800 B.C.

FIG. 2.



The astronomical probabilities of each of these four stars is equal in degree ; but it should be remarked that α Arietis is not at all conspicuous in the heavens, either by position or brilliancy ; though it must not be forgotten either that this star, or rather the constellation to which it belongs, had great importance in the astronomy of eastern countries in early days ; marking as it did the sun's entry at springtime on a new year—the term, indeed, persists to our own day ; the sun still being said to be at “ the first point of Aries,” when it is at the spring equinox, though the actual coincidence of α Arietis with the equinox has not occurred since the fourth century B.C.

Taking the Pleiades date of 1750 B.C., it would make the building of this line practically contemporaneous with the two long Capella lines, which, from the similarity in size and description of their stones, is in the highest degree probable, whatever their date. I would even go farther, and say that the Pleiades star-date forms a valuable check on the accuracy of the Capella star-date for the founding of the monument. But the Spica date of 1250 B.C. and the Aldebaran date of 800 B.C. are just as astronomically probable, though neither is supported by the date given by another line, in the same way as that of the Pleiades.

I would now call attention to the fact that line D, the “Pleiades line”—if I may so name it—and the “Equinoctial line” (line B), if produced towards one another, meet at a point on the central line of the tumulus covering the sepulchre, at its southern edge which is *exactly* equidistant, namely, in each case, 69 feet 6 inches from the terminal stones of lines B and D (see Fig. 2). A single position is thus afforded from which an observation can be made along both these lines : a position, too, which is symmetrical with the tumulus and the two Capella lines, lying as it does on the central line of the avenue formed by them. This connection between the equinox and the rising of the Pleiades is of particular interest in the light of the following well-known quotation from Diodorus Siculus concerning the “Hyperboreans.” The first part of the quotation, bearing on the Metonic Cycle, has already been cited (*vide supra*).¹

QUOTATION.

(Diodorus Siculus, ii, 47, ed. Didot, p. 116.)

“It is also said that in this Island (*i.e.*, that of the Hyperboreans) the moon appears very near to the earth ; that certain eminences of a terrestrial form are plainly seen upon it ; that the god (Apollo) visits the Island once in a course of nineteen years, in which period the stars complete their revolutions, and for this reason the Greeks distinguish the Cycle of nineteen years by the name of the Great Year. During the season of his appearance the god plays upon the harp,

¹ It is, I understand, by no means certain that the “Island” of the “Hyperboreans” refers, definitely, to Britain ; but the quotation clearly points to some race inhabiting a country northward of Greece, where solar and stellar observations, of a religious character, were made in early days.

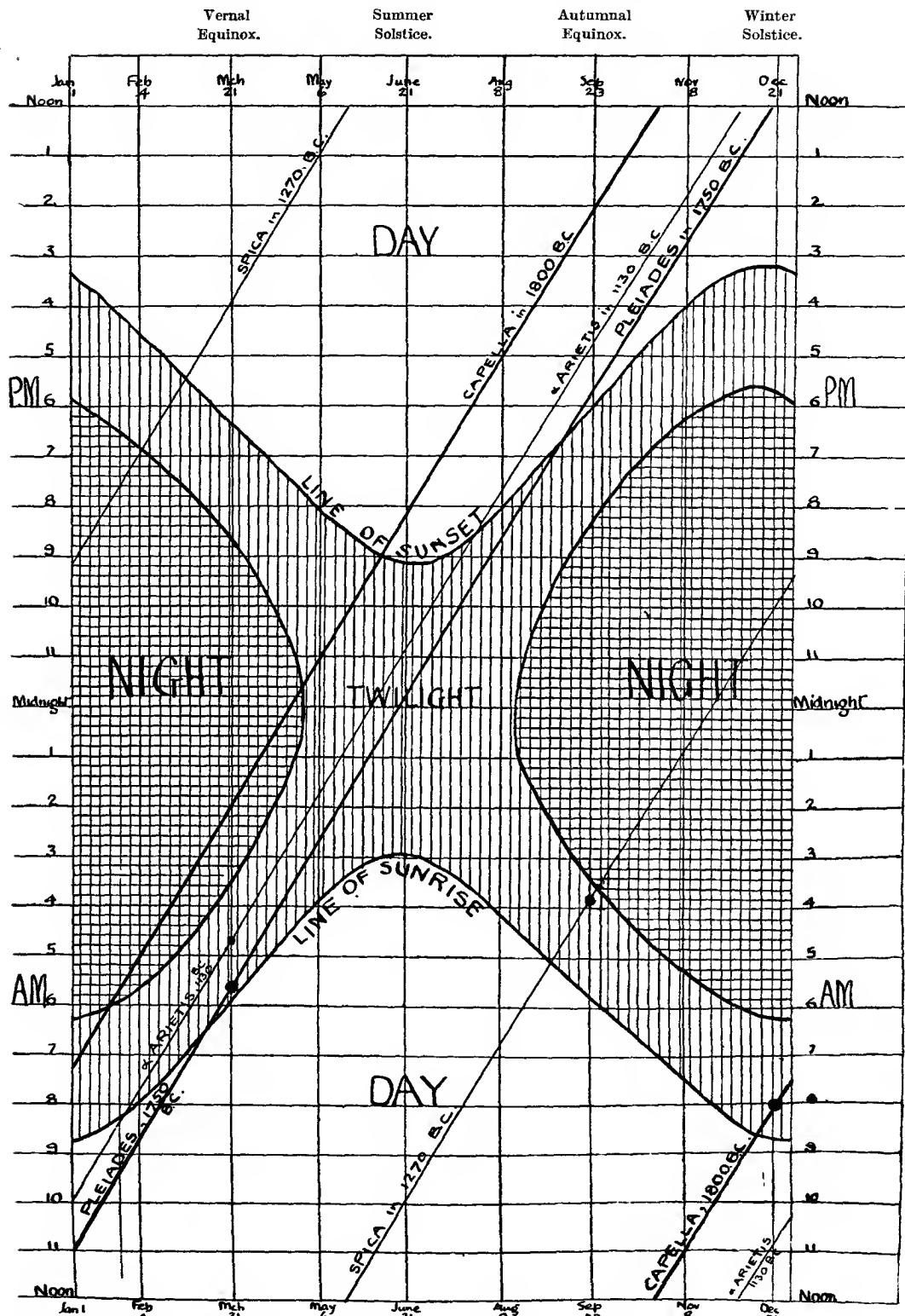


FIG. 3.—Diagram of the conditions of DAYLIGHT, TWILIGHT, AND DARKNESS throughout a year in Latitude 58° N. (*Callanish*) combined with the TIMES OF RISING OF CERTAIN STARS AT GIVEN DATES throughout the same period, at same Latitude.

the spaces between the tall stones of the "circle" and defining its outline, but now only to be traced in the western part of the ring.

The enquiry so far refers us to certain stars and their dates, as obtained from their declinations. But there is another point to be considered, namely, the time of year at which the inferred stars thus rose, at the epochs to which they belong.

Without entering deeply into astronomical facts, it should be stated that while stars rise on the same *bearing* (practically), on every day throughout the year, their *time* of rising alters, for they appear about four minutes earlier on the horizon of the observer on each successive occasion. It will thus be realized that the rising of any particular star can only actually be *seen* during a certain part of the year, namely, for the period that it rises between sunset and sunrise; or rather between the end of evening twilight and the beginning of morning twilight.

The accompanying diagram (Fig. 3) represents in pictorial form the varying conditions of daylight, twilight, and darkness, throughout a year at the latitude of Callanish. The diagonal lines running across the diagram show, at their points of intersection with the others, the actual time of rising of the star whose name they bear, at different times of the year; namely, of Capella in 1800 B.C., of the Pleiades in 1750 B.C., and of Spica in 1270 B.C.

I will deal first with Capella in 1800 B.C. It will be seen in the diagram that at that date it rose just before sunrise at the winter solstice. It rose in darkness thence-forward, earlier and earlier each night, until the middle of May: when it rose about one hour after sunset. Subsequently to that it rose in daylight until the following winter solstice; but it was visible every night, at some part of its course.

This connection between Capella-rise and the winter solstitial sunrise is important; for the observation of the rising of the full moon every nineteen years (discussed at p. 29) always takes place at this (the Saturnalian) time of the year; and the "heliacal" rising of Capella would thus have "warned" both these great solar and lunar events. Hence, perhaps, the greater length, and the important terminal menhirs given to these two lines of stones.

An interesting fact in connection with Capella, as seen from Callanish in 1800 B.C., must now be stated.

In this year, at that latitude, Capella performed its path round the pole at a distance from it of $57^{\circ} 33'$. At Callanish, the north pole of the heavens is elevated $58^{\circ} 12'$ above the horizon; so that Capella, when at the lowest point of its path, was some $39'$ above the horizon, and thus never set below nor rose above it: it was "circumpolar," as it is termed. But the skyline of the hills towards which the long lines of stones is directed, is elevated $1^{\circ} 14' 50''$, so that Capella was obscured from sight by the hills, when at the lower part of its course, just as much as if it had sunk below the sea horizon; and thus its "rising" actually could have been observed, only it was above a hill horizon, instead of a sea horizon.

By about 1700 B.C., a hundred years after the date that I have assigned to the erection of these lines of stones, the declination of Capella would have altered

sufficiently to cause this apparent “rising” to cease ; and Capella would then always be in sight at night, circling round the pole. Alignments for Capella have been found in several prehistoric monuments, and it is conjectured that its circum-polar movement may perhaps have been utilized for calculating the time at night, just as the attitude of the constellation of the Great Bear in its swing round the Pole Star is used as a “shepherd’s clock” at the present day.

As regards the other star alignment, that to the eastward, it may have been the Pleiades, in 1750 B.C. as stated above, or, with equal astronomical probability, the star Spica (α Virginis) in 1270 B.C. If the Pleiades, this group rose in bright twilight—too bright for observation—at 5.37 a.m., or about twenty minutes before the sun, on March 21st, but was *visible* as a rising body from April 10th onwards, until the middle of August, when it rose just as the sun set. For the rest of the year the rising of the Pleiades took place in daylight, and was consequently invisible.

If the star, on the other hand, was Spica in 1270 B.C., it rose in that year at one and a half hours before the sun at the autumnal equinox, thus “warning” that event, and as the opposite radiating arm of the “cross” to this we are now considering pointed to the sunset of the same date, there seems some possibility that Spica, (with its appropriate date), was the heavenly body for which this alignment was laid out ; or, in the course of the centuries, it may have succeeded the Pleiades as a date-fixer for the “dancing” of Apollo. Spica was visible as a rising body during the winter months, from September 21st to the middle of February, when it rose at about one hour after sunset. During the rest of the year its rising took place in daylight.

SUMMARY.

Before summarizing the particular inferences to be derived from each feature of Tursachan Challanish, I wish to point out a general inference, which should set at rest any doubts as to the reality of the factors of astronomy and orientation in this ancient monument.

For what is Orientation, or Direction ? What is the meaning of North, South, East, or West ? How did we derive these fixed points to start with ?

Not from any local or national origin ; for pure Direction is entirely independent of locality ; it is, in fact, derived solely from the movements of the “heavens.” It is only by reference to the positions of the stars, sun, or moon, that Azimuth, or true Direction, exists : there is no other meaning in the term.

So that when, in the monument just described, we find two lines of megaliths laid out on absolute “cardinal points,” viz., West and South, the setting and nooning points respectively, we realize that it can only have been accomplished by some reference to the heavenly bodies : (magnetic compasses, and their divergences from the true meridian presumably being unknown in those days).

And if these two lines of stones could so be laid out (and I think that no one,

can suppose that their directions are due to mere chance), the inference is irresistible that the others also are astronomically aligned, though for what purpose we are not able definitely to say.

We may summarize, therefore, the results of the preceding investigation as follows :—

- (1) There is a single point, situated on the southern edge of the tumulus covering the now exposed sepulchre, from which an observer finds himself aligned by lines of megaliths for the equinoctial sunset along line D, for the rising of Capella along the central line of the avenue formed by lines "A east" and "A west," and for the rising of the Pleiades along line D: the two latter events during the epoch 1800 to 1750 B.C.
- (2) Line C is laid out on a true north and south line with the Great Menhir erected at the western edge of the tumulus. All the alignments, therefore, are connected with the sepulchre as their point of origin.
- (3) Evidence possibly exists, from the direction of the line joining the two outlying menhirs, of the observation of moon-rise when it is Full Moon at the extreme northern tropical point of its path, occurring every nineteen years; thus marking that epoch.
- (4) The Great Circle, besides being constructed of megaliths of a different, and much larger type from the others, is placed entirely asymmetrically to the remainder of the group: and is, therefore, probably a later, and possibly an alien construction, intended to invalidate, or to mar the astrologically auspicious qualities of the alignments.

II.—THE SMALLER CIRCLES AT CALLANISH AND VICINITY.

There are at least four circles standing in the neighbourhood of the great and complex monument described above; and though these are all in a much ruined state, some reference to them may be of interest.

Their positions and attitude towards the great circle can best be realized from the map of the district appended. Two of them are quite accessible to the tourist who makes the expedition to Callanish from Stornoway, as they are close to the road, and meet the eye at once, each standing on its little eminence.

I have numbered these, for convenience of reference, as (1) and (2). Circle No. (3) is also at no great distance from the road, but is more out of the beaten track, being about a mile beyond the Garry na Hine Hotel, on the side road that leads past it, to the southward.

Circle No. (4) is farther off, and is most easily reached by boat, as it entails a very roundabout journey by road to get anywhere near it.

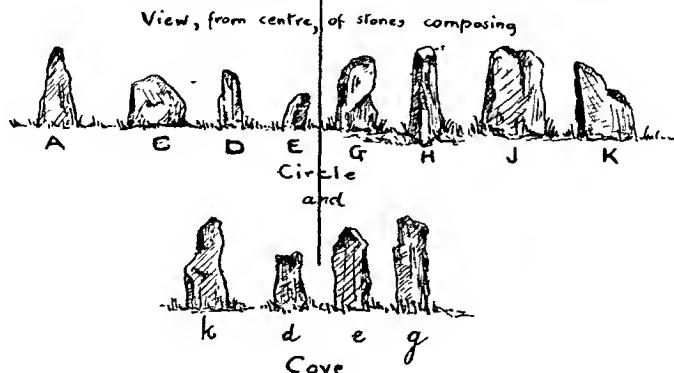
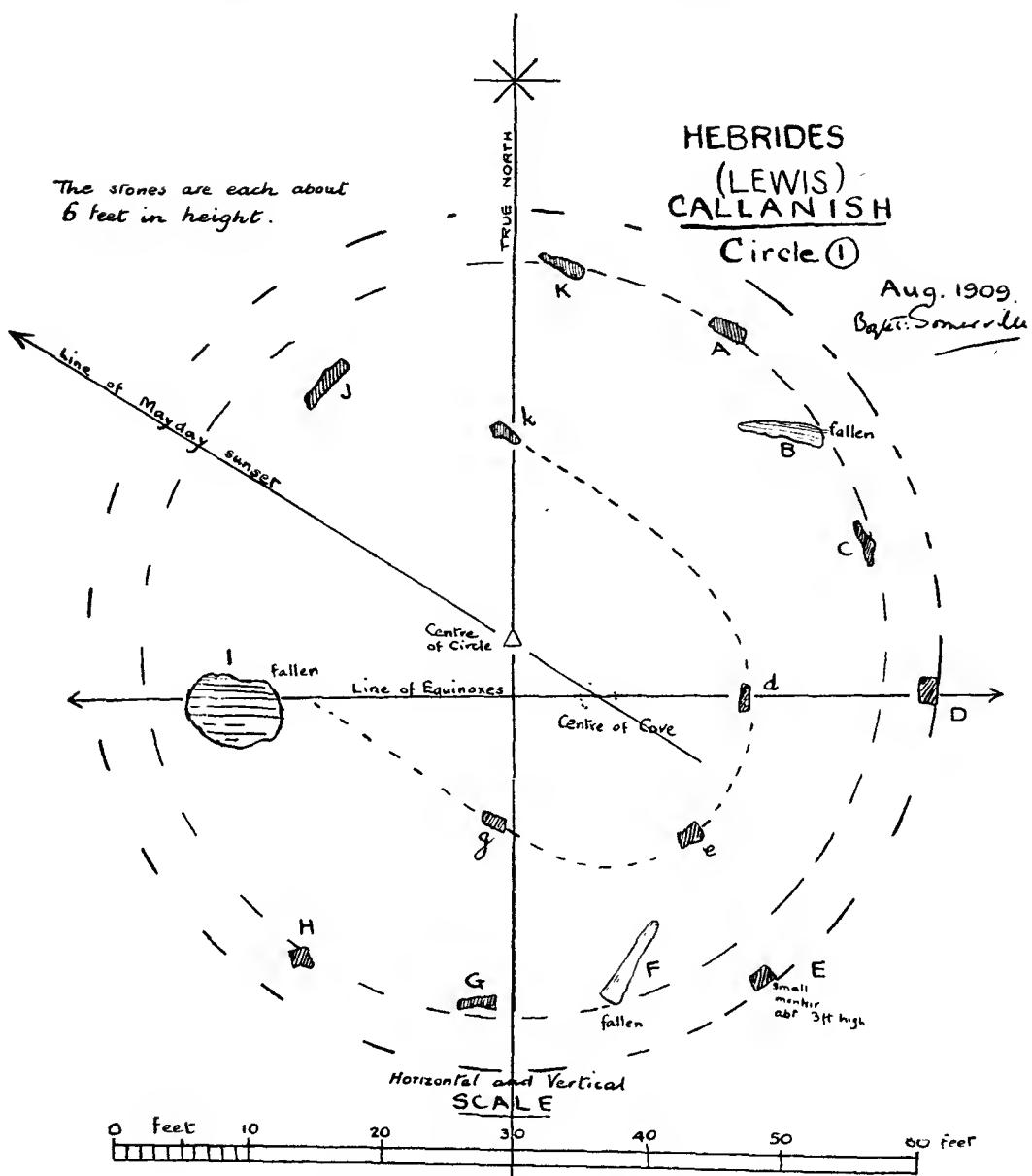


FIG. 4.

CIRCLE No. (1). (FIG. 4.)

This monument at present consists of a circle of about 56 feet in diameter, composed of eleven monoliths (three of which have fallen), enclosing what appears to have been a "cove," of which four stones remain in place. The "circle" is not a regular figure, as it now stands, but six of the stones forming it, which remain erect, stand on a truly circular line; the other three erect stones being placed a few feet inside and outside the circle as derived from the first named. Judging by the distances between the stones still standing, the whole circle was probably originally formed by fifteen stones.

Whether the irregular ones have been thus placed purposely, or so as to avoid the necessity of cutting a hole for a foundation beneath the surface soil into rock, or whether the irregularity is due to displacement through earth-movements since the circle was erected, is not possible to decide from surface appearances, though excavation might partly decide it.

The seeming irregularity might point, possibly, to there having originally been an inner and an outer "wall" of great stones, enclosing between them an earth bank, somewhat in the fashion of those described by Mr. A. L. Lewis as occurring at Lough Gur, in County Limerick, Ireland. It may be recalled (see p. 33) that there was the remnant of an enclosing "wall" of small stones, filling the spaces between the monoliths of the Great Circle; so that the idea is not foreign to the neighbourhood.

The "cove," as I conceive it, is also rather irregular; but seems to have been directed more or less towards the sunset of May Day, which is known to have had importance as a festival day in pagan times. There are no traces of a burial within this circle, though it is not impossible that one so existed in former times. There are several cairns visible on the hill-crests around the horizon. I was informed by a native of the place that many, if not all, of these are quite modern; for the building of cairns forms a sort of pastime for the boys tending sheep on the hill-sides; and without actually visiting each of them, it would be impossible to say which had an archaeological import, and which not; though it is quite possible that some are ancient, and intended to indicate an astronomical alignment.

No outlying stone or row of stones now exists near this circle from which to derive any astronomical purposes in connection with it.

CIRCLE No. (2). (FIG. 5.)

This circle stands on a small plateau a little below the first, and is in an even more ruinous state, as only five of its megaliths remain standing, and three fallen. The original number was probably thirteen. Those *in situ* stand on the circumference of a circle 67 feet in diameter.

A ruined sepulchre, of irregular shape, which once was probably circular, is placed, not in the centre of the circle, but inclined towards the north-eastern

HEBRIDES
LEWIS
CALLANISH
Circle (2)

Aug. 1909.

Boyle Somerville

TRUE NORTH

Line of Mayday sunrise
(Centre of Circle (1))

Centre
of Circle

Remains of cairn of small



View, from centre, of stones composing
Circle
(drawn to scale)

0 feet 10 20 30 40 50 60 70

SCALE
(Horizontal and Vertical)

FIG. 5.

quadrant. There is no trace left of any burial cist at its centre. The ring of small stones, 7 to 8 feet wide, that indicates the site is about 25 feet in diameter, and stands a few inches above the soil.

Any connections between this circle and the many cairns on the surrounding hill-tops labour under the same doubtfulness as those described under Circle (1), and are not worth entering into; but the centre of the first-named circle is exactly on the line of sunrise of May Day, from the centre of the second; and one must conclude that this is probably intentional. I cannot find any connection of astronomical import between either the first or second circles with the Great Circle; which is more strange, since it is easily visible, and, of course, very conspicuous from each of them; appearing as a regular forest of tall stones cresting the ridge.

Circle No. (2), besides being somewhat larger in diameter than No. (1), is also composed of more remarkable stones; those remaining being from 6 to 9 feet in height; that lettered "A" in the plan being especially conspicuous, with a wide base, tapering to a pointed top. From the centre of the circle this stone lies exactly on the line of summer solstitial sunrise, to mark which may possibly have been its original intention.

CIRCLE No. (3). (FIG. 6.)

Circle No. (3) is at about a mile along the road that turns down past the Garry na Hine Hotel from the main Stornoway road. It is on the right-hand side, at about 150 yards from the road, near, but not actually on, the summit of a heathery hill, named Sron a' Chail (? "The Hag's Nose").

There is yet another circle, on the hill-side almost opposite this one, on the left-hand side of the road, from which it is distant 500 yards; but I was prevented from visiting it, owing to a sudden bad turn in the weather, through which my examination of No. (3) circle was completed only under great difficulties, in wind and drenching rain.

No. (3) has five stones remaining in its circumference, which was originally formed, perhaps, by seven. Three of these are placed on the circumference of a circle 36 feet in diameter; the other two on a concentric circle 42 feet in diameter with the line joining them directed towards the Great Circle of Callanish, easily visible, distant two miles. In the north-western quadrant there is the remains of an oval band of small stones, forming an enclosure, in the middle of which is a small standing stone slab, 2 feet 6 inches high, which is planted in the ground on a line N. 22° W. and S. 22° E., or roughly, also in the direction of the Great Circle; but this is all that remains of the burial cist. The soil is marshy, and there is an accumulation of peat, three or four feet deep, surrounding the circle, which has been removed within its circuit to the original ground level. The stones composing the circle are all large and vary from 7 to 10 feet in height. That marked "A," which directs the eye from stone D across the circle to the Great

Circle, is especially noticeable:—a massive pillar stone, 8 feet in height, with a pyramidal top and well-trimmed sides and angles.

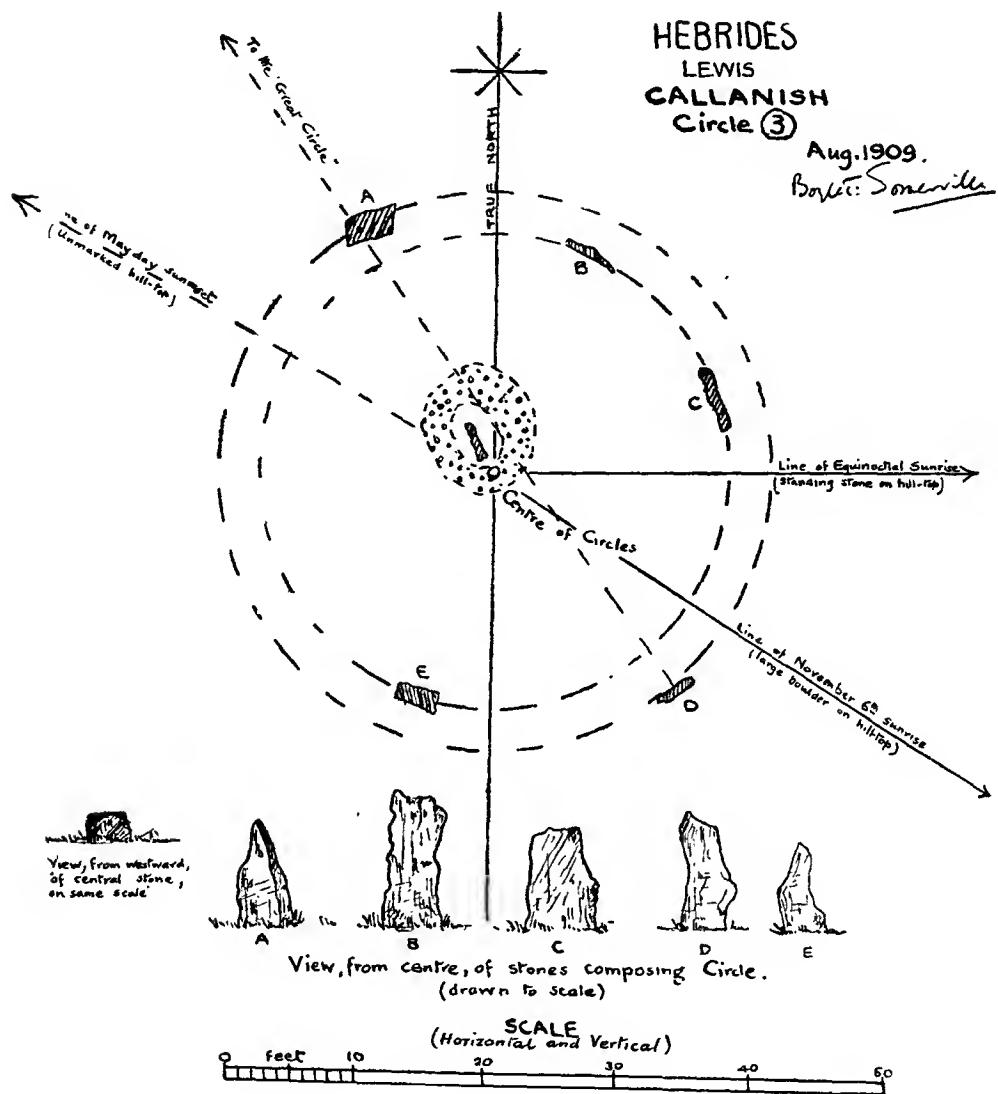


FIG. 6.

The following astronomical events are observable from this circle on the surrounding horizon line, as seen from its centre, by bearings of objects; two of which are of an artificial nature. I do not take into account cairns, for the reasons before stated:—

- (a) Two standing stones on the skyline of a hilltop at some considerable distance, (more than a mile), which may possibly form part of a ruined circle. Bearing $89^{\circ} 51'$, elevation $0^{\circ} 20' 00''$, giving declination $0^{\circ} 12' N.$, or sunrise on the day of the Equinox.
- (b) Large boulder on a skyline hilltop, distant about one mile. Bearing

$122^{\circ} 13'$, elevation $0^{\circ} 34' 30''$, giving a declination of $15^{\circ} 57'$ S., or sunrise on November 6th.

(c) A small hilltop plateau, a few miles away, which is almost exactly level with the distant skyline horizon of hills as seen from the circle. Bearing $299^{\circ} 03'$, elevation $0^{\circ} 06' 30''$, giving a declination of $14^{\circ} 50'$ N., or sunset on May 1st.

NOTE.—As this hilltop is not artificially marked, this alignment should perhaps be looked upon as fortuitous: but the *astronomical* fact is undoubted; and as this was anciently an important calendrical or religious date, it probably was an intentional alignment. I may remark that I have found in other places this arrangement of an alignment, at which the near and distant horizon of hilltops appear superposed or nearly so; or, sometimes, of a near horizon cutting off, as it were, the summit of a distant hill.

CIRCLE NO. (4). (FIG. 7.)

The only other megalithic monument in the neighbourhood of Callanish that I was able to visit is situated on the edge of a perpendicular cliff, about 50 feet high, on the north side of the narrow channel separating Great Bernera Island from the main island (Lewis). Four stones remain out of what were probably originally seven. Of these three are standing, the other having fallen over, apparently more or less recently; yet, ruined as it is, this monument possesses singular interest from the fact that it is not a "circle," as for convenience I have styled it, but a semicircle, with a diameter of about 68 feet (see plan).

It is, of course, possible that the cliff may have subsided since the date of the erection of the whole circle, though there is no appearance, by fallen débris, or of a new surface to the rock precipice below, (for it is of *rock*), that this has taken place. But if there has been a subsidence, it is at least remarkable that the straight edge of the cliff-top, after the occurrence, should form practically the exact east and west (true) diameter of the circle, so that the centre of the remaining semicircle should be on a small irregular hummock of rock, a foot or so inside the edge.

There is no trace on the ground surface of a burial within its limits.

There are observable from the centre of the semicircle several interesting astronomical alignments, all solar.

I must here make a short digression to refer to a feature which I have found in several places in connection with the outlook round the horizon of ancient monuments, not only at this particular one, but elsewhere. This is the occurrence of large and massive boulders of rock on the sky-lines of the hills surrounding the monument, but not necessarily on their summits; and as I have found that many of them are on particular alignments of the rising or setting of the heavenly bodies, sun, moon, or certain stars, I cannot but suppose that some, at least, have

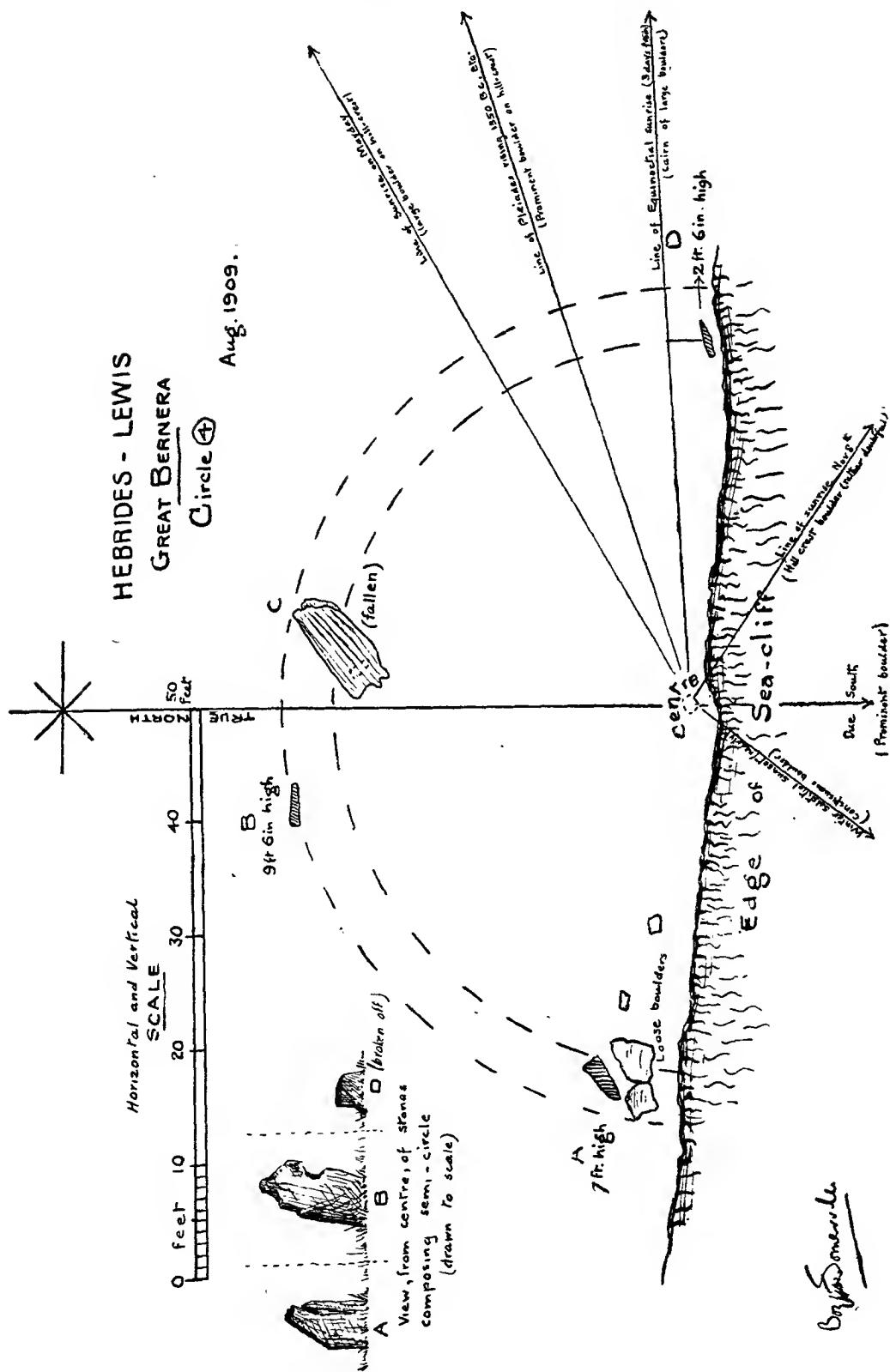


FIG. 7.

actually so been placed, in order to form the terminal point of the alignments, or else that the monument itself—the point of observation—has been erected so that any particularly conspicuous hill-crest boulder should be on the correct bearing from it. It does not follow that because *every* boulder visible from a monument on the sky-line is not on an astronomical alignment, that the occurrence is fortuitous when it does so happen; for it is quite possible that while some of those in sight from a particular monument are in connection with it, the other boulders may easily be connected with other monuments in the vicinity, each of which would, of course, require some alignment mark; and it would be very improbable that the boulders that would suit one point of observation would be correctly placed for another. Boulders perched on a hill-crest are not in themselves very common objects; and when, from the central point of a circle, one is seen conspicuously standing out as a dark point against the bright sky, and when its bearing and elevation produces, (for example), the solstitial declination, the inference is almost irresistible that it was placed there in order to indicate the sunrise, or sunset, of that date; or, as I suggest above, if the boulder should have been too massive for transportation (even for those who could carry into position, and erect, the immensely heavy monoliths of the great circle of Callanish), that the required monument was placed so as to take advantage of the naturally placed boulder.

I have already referred to such a boulder "fore-sight" (as we may term it, from its resemblance to the uses of the fore-sight of a rifle or gun) when discussing No. 3 Circle, and I know of other examples at Carloway, (not far from Callanish) at Lochboisdale, (in the Hebridean Isle of South Uist), at St. Kilda, and in the Lough Swilly district in County Donegal, Ireland.¹

I will now continue my remarks on the Semicircle No. 4, and enumerate the astronomical events observable in the alignments to hill-crest boulders seen from its central spot:—

- (a) Large boulder on hilltop, bearing $60^{\circ} 21'$, elevated $1^{\circ} 30' 00''$, producing declination $16^{\circ} 22' N.$, or sunrise on May 6th.
- (b) Prominent boulder, bearing $74^{\circ} 01'$, elevated $1^{\circ} 04' 00''$, producing declination $8^{\circ} 54' 49'' N.$, or

Rising of Pleiades	in 1350 B.C.
„ „ Spica	„ 1700 B.C.
„ „ α Arietis	„ 740 B.C.
„ „ Aldebaran	„ 310 B.C.

(NOTE.—The two last stars must be looked upon as doubtful, as producing dates possibly too recent for the style of monument; though not necessarily so.)

¹ The latter is actually propped up with smaller stones, in order to make it stand up prominently. Its artificial attitude is undoubted, though I was unable to find any trace of the monument with which, presumably, it once was connected.

- (c) Large boulders heaped into a cairn on hilltop, and, from their size, evidently ancient, bearing $88^{\circ} 04'$, elevated $0^{\circ} 46' 00''$, producing declination $1^{\circ} 33' N.$ Sunrise of March 25th and September 19th was thus indicated; no doubt intended for the Equinoxes, being about three days off in each case.
- (d) Boulder (not very conspicuous), bearing $124^{\circ} 45'$, elevated $1^{\circ} 27' 00''$, producing declination $16^{\circ} 15' S.$, or sunrise of November 8th.
- (e) Prominent boulder on hill-crest, bearing $180^{\circ} 10'$, elevated $1^{\circ} 22' 00''$, producing the true meridian of the circle (due south).
- (f) Conspicuous boulder on hill-crest, bearing $218^{\circ} 00'$, elevated $1^{\circ} 22' 00''$, producing declination $23^{\circ} 18' 37'' S.$, or sunset on December 16th and 28th, namely, six days before and after the day of winter solstice. (The hills were too hazy further on to the westward to permit of observations in that direction.)

III.—ISLAND OF ST. KILDA.

The Island of St. Kilda, which is separated by about forty miles of stormy water from the nearest part of Harris, in the Hebrides, was evidently inhabited in prehistoric times, (judging by the remains now to be described), in spite of its remoteness and difficulty of access. That they were able to sustain life in that desolate spot seems to point almost inevitably to the existence of the use by the inhabitants of domestic animals, such as sheep, for food; and, indeed, a small flock of "aboriginal" sheep, which greatly differ both in size and colour from the modern variety, persist there to the present day; being preserved by the owner of the islands on Soay, one of the three islets forming the St. Kilda group.

The boats of prehistoric times must have been of a superior build also to have reached the island at all, and the fact of their employment argues some considerable advance in the art of navigation.

I have discovered the remains of at least two prehistoric structures on the Island of St. Kilda, and I have no doubt that the stones of others are built into the walls of the houses of the little settlement of about seventy souls, who now inhabit the place.

The two monuments of which I speak, which, so far as I am aware, are new to science, are dolmens. They are situated at the south-eastern corner of St. Kilda, about 200 yards from one another. No. 1 is on the very edge of the sea cliff, about 350 feet high; indeed, in a sense, it overhangs the cliff, for it is erected on the top of a sort of "pulpit" of rock that projects from the top of the otherwise perpendicular cliff, while No. 2 is in a less giddy position, several feet inside the edge, and on comparatively level grassy ground.

DOLMEN No. (1). (FIG. 8, AND PLATE VIII, VIEWS A AND B.)

This dolmen consists, as may be seen in the photograph and plan, of a triangular, flat-faced slab of stone, one side of which is supported on the natural

surface of the rock, which slopes upwards; the other propped on two other flat slabs, in such a manner that the top surface is roughly level; the whole being erected on the top of the projection of the cliff edge, to which I have just referred.

The space left beneath the capstone is only a few inches in height above the rock surface and altogether too limited in area for the placing in it of a body, or even of a jar of cremated remains. The object of the dolmen appears to have been entirely for observation purposes.

The capstone is, as has been said, triangular, with two long, nearly equal sides, and a shorter base. Standing at the centre of the base, (Plate VIII, View A), it is seen that the apex is directed towards a hilltop less than a mile away, which is marked—obviously by the hand of man—with a pointed boulder, supported on others, in the manner seen in the photograph (Plate VIII, View B). This presents a near view of it, but is taken from the same aspect. There is no doubt, when standing at the base of the dolmen, and looking along its length to the point, that this remarkable object is that to which an observer is intended to cast his vision.

The bearing is $309^{\circ} 22'$, and the altitude $8^{\circ} 44'$. This produces a declination of $28^{\circ} 32'$ N., and possibly refers to the setting moon, at its extreme tropic declination, marking an epoch of nineteen years (see p. 29, where a similar declination, obtained at the Great Circle of Callanish, is discussed).

I should add, however, that (with equal astronomic probability) it might refer to the following star, namely, Pollux, in 1200 B.C.

DOLMEN No. (2). (PLATE IX, VIEWS A AND B.)

This dolmen is of a somewhat different character from that just described. A large number of biggish boulders have been assembled into a shape roughly oval in plan, and 25 feet in length. They are not heaped one on the other, but placed near one another on a piece of rising ground, near the edge of the cliff. At the southern end of the "oval," that is, at its highest part, a large rough boulder is supported, at a height of about 1 foot 6 inches from the ground, on two of the boulders of the group, and at its northern end by a natural projection of the rock surface. The space thus roofed over is about 6 feet long, 3 feet wide, and 1 foot 6 inches high—of a suitable size and shape, therefore, to contain a body; though inhumation would not be possible, the ground having a flat rock surface (Plate IX, View A).

The capstone lies with its long side in the direction of the main axis of the "oval": and looking along it to the southward, the eye is directed towards an object so fantastic and remarkable that, placed as it is on the very edge of a tremendous precipice, 450 feet high, I cannot suppose it to be other than natural, though it has all the appearance of being artificial.

The photograph, (Plate IX, View B), which was taken at a distance of about 30 feet, gives an excellent representation of this strange "window," formed by the supporting of a great slab of stone, 8 feet 6 inches long, 7 feet 5 inches wide, 2 feet

6 inches thick, on two natural supports of rock about 7 feet high. Not more than a couple of inches of holding keep it in its place at either end; yet it has stood, one must suppose, thus, for many centuries at least, the terrific fierceness of the squalls, and pressure of the winter gales, for which St. Kilda is so renowned.

The natives have a name for this object, which, pronounced as it is, something like "slain deal," I gather (from a Gaelic dictionary) to be "sleamhain diollaith"—the "slippery saddle"—which is a fairly descriptive title.

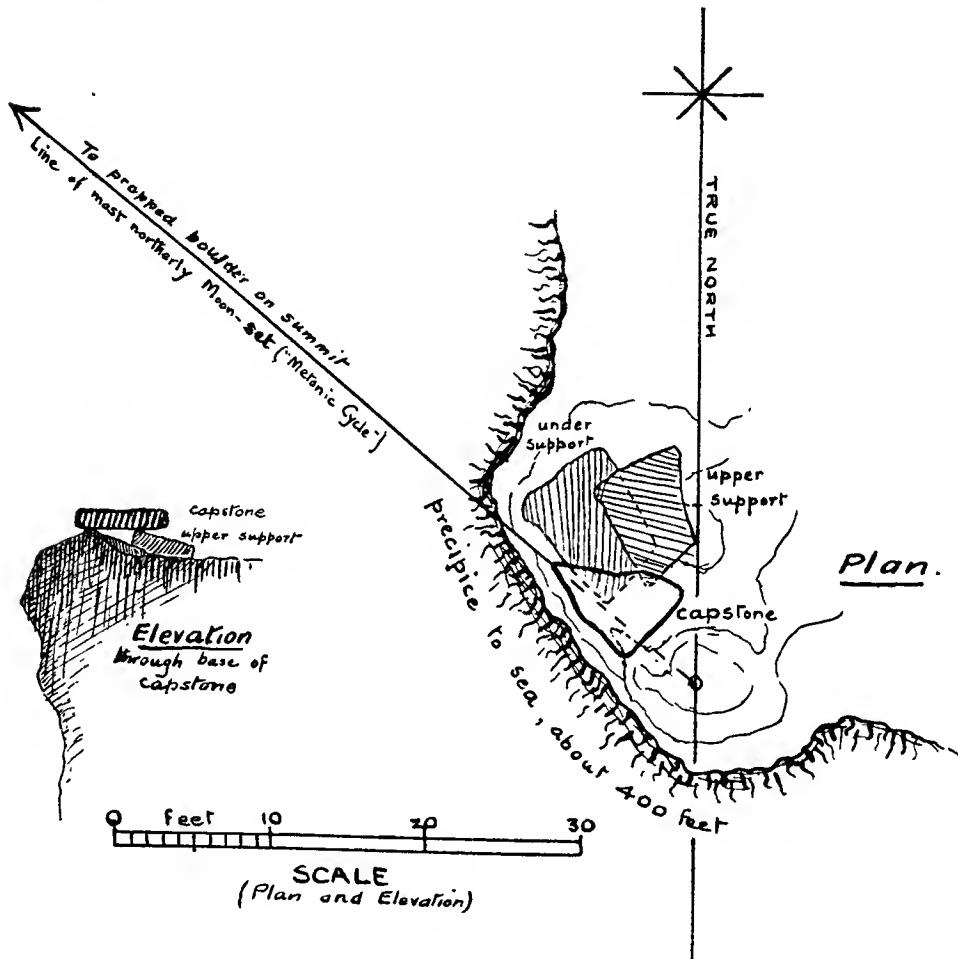


FIG. 8.—ST. KILDA ISLAND.

Dolmen 1.—Aug. 1909.

The photograph of the dolmen, which is taken in the direction in which it is pointing, shows the great window as being exactly in the same line, and is obviously the object used as a "foresight"; the heavenly body being seen through it.

The bearing of this line is $165^{\circ} 50'$, and the altitude $9^{\circ} 05'$, which produce a declination of $22^{\circ} 13' S.$

One star to which this could be referred is Sirius (*a* Canis Majoris) in about 2500 B.C. There is nothing inherently improbable in this (except that the date

seems unusually remote for a British monument), for it is known that this star was employed in ancient Egypt, to "warn" the summer solstice at a date anterior to that given above. The only other star is Rigel (α Orionis), in about 2300 B.C., and, astronomically speaking, this is equally likely.

But what appears to me to be as more probable than either of these is that the alignment was for the sun, at about eighteen days before the winter solstice. In various parts of Wales, such an anticipation of the actual solstitial date has been discovered in several monuments, and the celebrated "Friar's Heel" stone at Stonehenge seems to have been erected so as to give warning by several days of the actual day of the solstice.¹

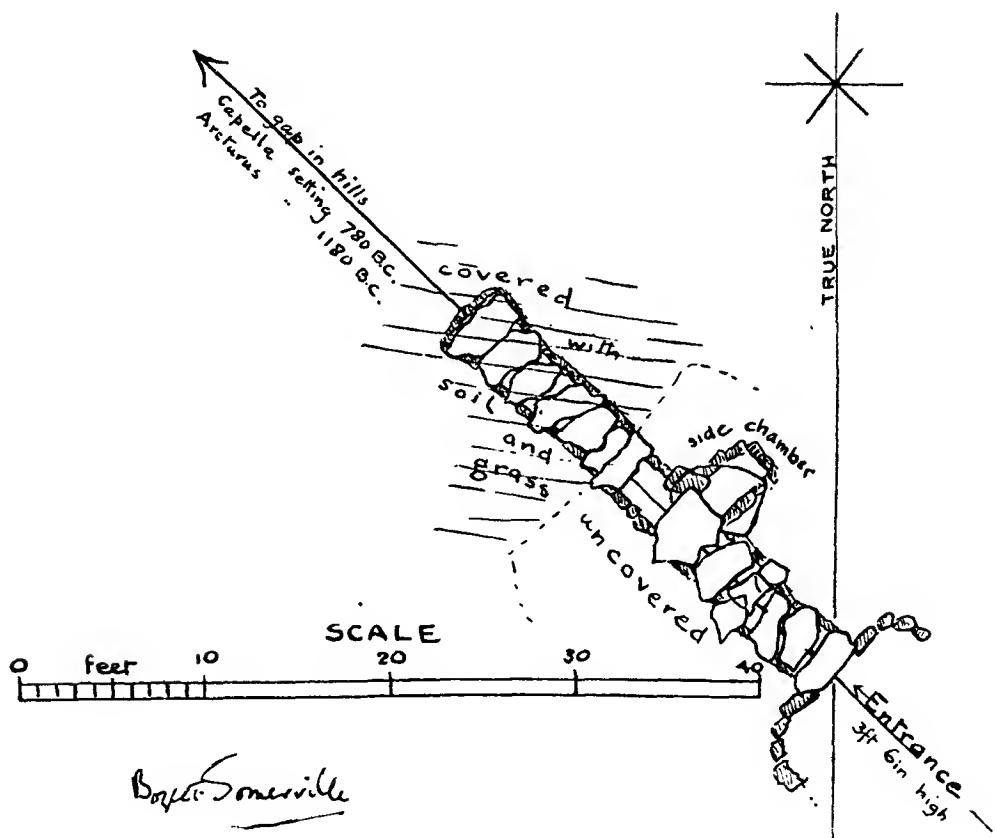


FIG. 9.—ST. KILDA ISLAND.
"The Fairy House."—August, 1909.

The covering flagstones at present exposed are a few inches below the soil-level; and are supported on a dry-walling about 3' 6" high, over an earth floor: the whole thus being subterranean.

¹ A relic of this "anticipation" is said to remain to us in the date of Advent Sunday, which falls at about three weeks before Christmas Day. Just as the latter is considered to be the Christianized version of the pagan midwinter (solstitial) festival; so may we suppose that Advent supplanted a pagan day on which preparation for the great feast may have begun.

THE FAIRY HOUSE. (FIG. 9, AND PLATE VIII, VIEW C.)

There is also on St. Kilda another relic of the prehistoric age, in the shape of an *allée couverte*, named "The Fairy House," which was unearthed, so I was informed by one of the inhabitants, about forty years ago, when the soil above it was being dug over for sowing. It yielded, my informant stated, a bronze weapon of some sort, some burnt bones, and some broken pottery, which, he understood, were in a museum in Scotland. The name ("The Fairy House") seems to have been invented purely for the sake of the tourists, and conveys no archæological connection with an old-established sanctity.

The photograph (Plate VIII, View c), which is taken from the south-eastern, or entrance, end shows the direction in which the *allée* is built, namely, towards a very marked dip in the high hills behind it, which I think is probably intentional. If so, the bearing of $313^{\circ} 56'$ seen along it, combined with the altitude of $17^{\circ} 55'$, produce a declination of $37^{\circ} 41' N.$, which was that of Capella in 780 B.C., or of Arcturus in 1180 B.C., either of which may be accounted, on other grounds, to be a probable date. This declination refers to no other bright star at any other date.

About two-thirds of the roofing stones of the *allée* are exposed, and are about a foot below the present surface of the ground; the remainder are still covered up. The height of the interior is of an average of 4 feet, and the width is about the same. The sides which support the slab roofing are formed, not of large stones on end, but of a sort of dry walling, of stones of various size, but none very large.

The photograph hardly shows what is an interesting feature, namely, the remains of a sort of semicircular walling, of the same nature as the interior, which faced the two sides of the entrance.

Enough of this still remains to prove its former existence, though a good deal of it has been removed; having proved to be too handy to the village, the "street" of which is only 50 yards away, to escape being built into outhouses, and so forth.

I mention this particularly as the semicircular entrance seems to be a marked feature of the Sardinian *allées couvertes*, or "Tombs of the Giants," recently described in *Memnon*, by Mr. Duncan Mackenzie.¹

I do not know whether other "Eirde Houses" (for that is the Scotch name for these subterranean tombs or dwellings) have this characteristic, besides the specimen on St. Kilda, but I look forward to examining other specimens, with this point in view.

There is at St. Kilda the remains of a "broch," situated on a point guarding the bay in which is the village, and extremely difficult of access. I mention this "fort" or "dun" (as it is named in Gaelic) chiefly on account of its association with the *allée couverte*, "The Fairy House"; for a "broch" or "dun" seems to be of very much the same style of building as the nuraghe of Sardinia, which are

¹ *Memnon*, 1908, "The Tombs of the Giants, and the Nuraghe of Sardinia in their West European relations."

always found in the vicinity of the "Tombs of the Giants" (see Mr. Mackenzie's paper in *Memnon* before mentioned); and this double similarity between the Scotch and the Sardinian towers and burial-places (or dwellings), both in actual appearance and construction, as well as in the association of this particular form of tower with this particular form of burial, becomes the more striking.

In conclusion, I would again bring forward the importance of examining the prehistoric monuments of this, as well as other countries, for the evidence of orientation. No one with any knowledge of surveying and astronomy can deny that alignments to definite points of the horizon do exist in some of our prehistoric monuments, at least; if not in all. Speaking for myself, I have thus examined fifty-five separate megalithic objects in different parts of Ireland and Scotland, and in all this number there have only been six in which I could not find evidence of orientation. The ethnological importance of this is, of course, very great, arguing, as it does, the existence of a knowledge of the movements of the heavenly bodies, which implies an unexpected degree of culture among the inhabitants of these islands at an early date; as well as a connection, at all events intellectual, with the western inhabitants of the Continent, to press the results no further.

The external character of the megalithic remains in all countries is so similar that it would not be surprising to find that an equally similar internal character of "religious" import should be inherent in their construction; and though identity of religion does not, of course, necessarily imply identity of race, it at least points to a missionary impulse from a single source of origin, into which it would be of great interest to enquire. So elaborate a science as astrology, if it can be proved to exist, could scarcely spring up spontaneously among a barbarous people; and in our cloudy climate would be unlikely to rise at all; the heavenly bodies being so rarely capable of continuous observation: unless, indeed, the meteorological conditions of 4,000 years ago were extremely different from those of to-day. If it is the case that such a cult once existed in these climes, we must, I think, look to a sunnier, less humid country than our own; such as that East, whence the British religion of to-day has sprung, as the place of origin for that of prehistoric days in these islands.

It is to be remarked, further, that the orientation of these ancient buildings in Britain is to the rising of the sun on definite days of the year (associated with the rising of certain stars, and of the moon), and that these days are the festival days of the early Eastern Mediterranean nations: equinoctial, solstitial, "half quarter days" (when the sun rises at a point of the horizon exactly half-way between that of the solstices and equinoxes; namely, with a declination of $16^{\circ} 30'$ N. or S.). These dates (and consequently the direction in which the rising or setting of the heavenly bodies marking them), having become of religious observance, it would not be remarkable to find as we do find, that the tombs of the dead—perhaps we should say the Temples of the Dead—should be laid out also, in one or other of these "auspicious" bearings; and the cult of the dead thus be associated with the cult of the heavens.

“Half quarter days,” mentioned above, which are known nowadays as Candlemas, May Day, Lammas, and All Hallows respectively, formed, as Sir Norman Lockyer has pointed out in “Stonehenge,” the important dates of the “agricultural year”; and their employment, therefore, denotes the probability of the nation to be in a pastoral, or more or less settled, condition; so that, if the star dates to be derived from the monuments we have been discussing have any reality, (and I find it impossible to doubt it), this in itself reveals at how early a date the state of settled life was established in these islands.

A fairly high condition of mental culture is arguable also, as I think anybody who has had to do with the manipulation and moving of heavy weights will agree, from the very bringing together and erection of the enormous stones that were employed in the making of circles, alignments, and dolmens. And when to this had to be added the skilful choosing of the site, so that the required risings and settings of the sun, moon, or stars should take place behind a definite hill-summit, (though, as I have pointed out, it was often necessary artificially to mark the azimuths), then, I think, it must be allowed that our ancestors of prehistoric times, though, unfortunately, they had not the art of writing, have left behind them a record of ability, both of brain and body, for which they have not yet had proper credit.



(F)—THE GREAT CIRCLE, SEEN FROM S.W., WITH GREAT MENHIR; LATTER A LITTLE TO LEFT OF CENTRE OF VIEW. SEE PP. 32 AND 33.

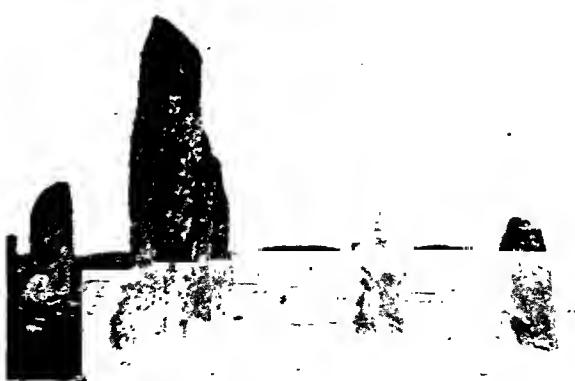


(A)—GENERAL VIEW OF LINES "A. EAST" AND "A. WEST," TAKEN FROM N. SIDE OF GREAT CIRCLE. SEE P. 25.



(D)—LINE B. SEE P. 29.

(Note.—The menhir in foreground is one of those forming Great Circle.)



(B)—LINE "A. EAST." SEE P. 27.

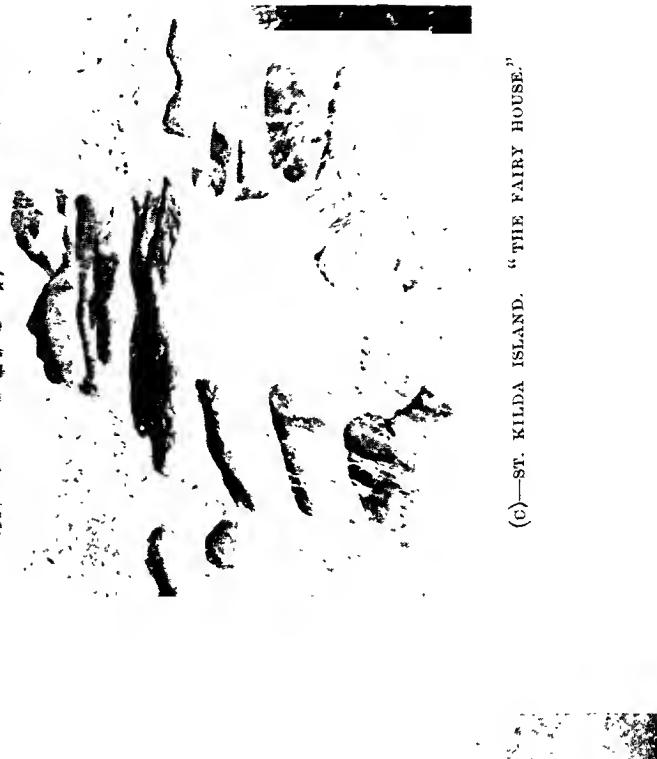


(C)—LINE "A. WEST." SEE P. 27.

(E)—GENERAL VIEW OF GROUP FROM HEAP OF BOULDERS TO SOUTHWARD, SHOWING LINE C IN LINE WITH GREAT MENHIR IN CIRCLE (SEEN JUST TO LEFT OF TELEGRAPH POLE), WITH LINES B AND D TO LEFT AND RIGHT RESPECTIVELY. SEE P. 30.



(A)—ST. KILDA ISLAND. DOLMEN (1).



(B)—ST. KILDA ISLAND. DOLMEN (1).

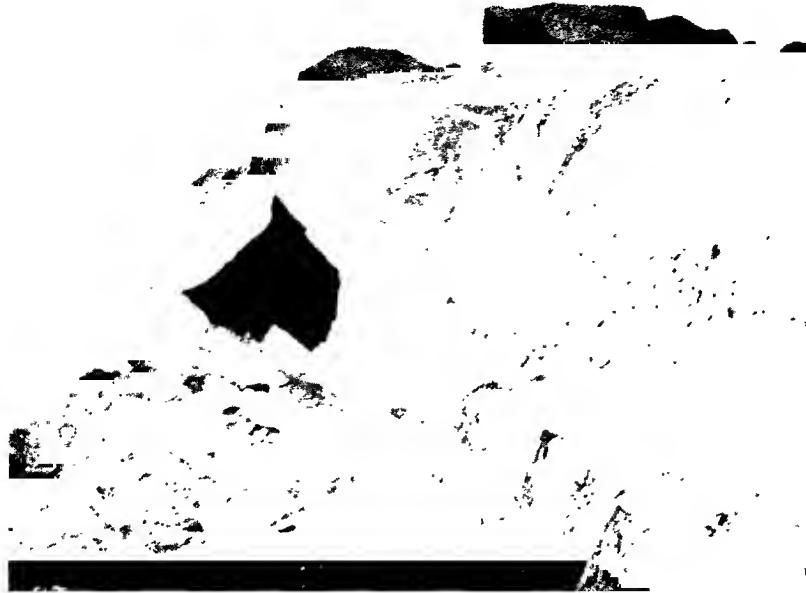


(C)—ST. KILDA ISLAND. "THE FAIRY HOUSE."

(A)—ST. KILDA ISLAND. DOLMEN (1).

PREHISTORIC MONUMENTS IN THE OUTER HEBRIDES, AND THEIR ASTRONOMICAL SIGNIFICANCE.





(A)—GENERAL VIEW OF DOLMEN (2), ST. KILDA, WITH "WINDOW" IN BACKGROUND TO WHICH IT IS DIRECTED. THE MAN SEEN IS STANDING WITH RIGHT HAND ON THE CAPSTONE.

(B)—NEARER VIEW OF "WINDOW" ("SLEAMAIN DIOLAIN") TO WHICH DOLMEN (2), ST. KILDA, IS DIRECTED.

PREHISTORIC MONUMENTS IN THE OUTER HEBRIDES, AND THEIR ASTRONOMICAL SIGNIFICANCE.

